PLASTICULTURE:

A NEW TECHNOLOGY IN AGRICULTURE PRODUCTION AND POST HARVEST MANAGEMENT.

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INTRODUCTION-

Plasticulture is a system in which plastic is used for agriculture activities including growing crops and for post harvest management. This is one of the latest developments in agriculture field, which is also acknowledged worldwide for improving agricultural production. Plastic is used in agriculture in different structure and forms depend upon for which purpose it will be used for. Synthetic polymers are the one that are considered as plastic. Plastic became more prominent material in daily life use due to its versatile property, structural integrity and chemical l properties. Plastics can be used in agriculture for mulching for maintaining optimum moisture and for suppressing the weeds (LLDPE and LDPE are the most used plastic mulches), canal lining, for nursery raining, sprinkler and drip irrigation, for the cultivation in green house, for storage facility of the produce and in the management of post harvest. It is mostly used for high tech horticulture (vegetables, ornamentals, small fruits, and plantation crops. In last ten years use of plastic in horticulture is increased dramatically where as the total manufacturers of plastic has been declined by 40% at the same time. Other polymers like polypropylene, polyester and polyvinyl are used in filters, fertigation equipments and connectors and contribute in agriculture production. Agronomic crops and horticulture crops are the two categories of plant species that is broadly included in agriculture. In India more focused is given in agriculture sector to make it healthy and sustainable because it contributes to Indian economy against 14% GDP. Therefore the introduction of plastic leads to the development of Indian farming system.

ADVANTAGES OF PLASTIC-

Before the introduction of plastic the farmers were dependent on traditional knowledge in agriculture practices. Plastic use over traditional knowledge of farmers helps in conserving water by avoiding evaporation losses, suppressing the weeds by using plastic mulches, checks the soil erosion, controls insect and pest attack and ultimately resulting into increased yield. Plastic material like ethylene- venyl acetate copolymer, glass fiber reinforced polyester, and polypropylene and polyethyleme are used prominently in agriculture. Biodegradable plastics like polysaccharide derivatives, poly amino acids, polylactic acids, polyhydroxyalkanoate, polycaprolactone are most safer polymers among other polymers present. Polymers have chemical, physical, thermal and mechanical properties which let it wide usability in agriculture field. It can be reused, has good thermal and water permeability.

USE OF PLASTICULTURE IN AGRICULTURE PRODUCTION-

Preparation of soil-

Soil is the main source of water and nutrients for the overall growth of the plants. It has uncountable number microorganisms that are beneficial for the plant growth and provide convert various nutrients in the available form of the plants. Soil sterilisation is the important step to protect pest attack in the plant and to destroy seeds of weeds. Soil sterilisation consists of soil fumigation and soil solarisation. For soil solarisation process soil is covered with a transparent sheet of plastic which results into the disinfection of soil. The thickness of the transparent sheet is very important in terms to kill the weed species. Soil solarisation require plastic sheet for at least 1 to 2 months for the proper eradication of pathogens from the soil. Soil fumigation is a treatment done to eradicate pest, disease and nematode. It requires transparent plastic sheet.

Management of Nursery-

Nursery is the area where seedlings are raised by taking proper care. In it seedlings are raised in pro trays, seedling bags and through plant propagation etc. All the activities need plastic. Use of pro trays for seedling raising gives disease, pest free environment and good and healthy seedling. Use of seed is also less in nursery. In the seedling bags bio plastic additives can be used as mulch. LDP bags are used in nursery. For the propagation wrapping material is required for successful completion of propagation. White polythene material is widely used in comparison to black polythene in air layering (litchi).

Mulching-

Mulching is the process in which soil is covered with synthetic or natural material which improves the soil health, suppress the weed species, and maintain optimum temperature and water of the soil. For the mulching polyethylene sheet is used and showed the most effective results in terms of controlling micro climate around the plant. It is also proved that plastic mulch is better than organic mulch in terms of increasing soil temperature, yield and plant growth. Potassium and phosphorous are available good enough in synthetic mulch as compare to organic or non mulched soil. Black plastic mulch maintains high C:N ratio for plant growth. The plastic films used for mulching are easily available, easy to transport and handle. Black colour LLDP is most widely used and has the better resistance to punctures.

Controlled environment agriculture-

Controlled environment agriculture provides the suitable and controlled manipulative environment for the whole growing season of crop therefore increases the quality, productivity and yield of the crop. This approach needs poly tunnels, greenhouse and shade net like technologies. Green houses are used during offseason to provide higher income to the farmers. The material that is used for covering the green houses is made up of plastic in different forms like polythene film, copolymer, single layer plastic, polythene film, double layer plastic etc. In shade net houses plastic nets are used which act as anti insects, wind break, anti hail etc. In poly tunnel plastic is used for maintaining soil temperature and air temperature.

Management of water-

Micro irrigation is one of the efficient methods used in agriculture for irrigation. It includes sprinkler and drip irrigation method which increases the water use efficiency; declines weed species, slow down the soil erosion and saves water. For its lateral and main pipes polyvinylchloride, low density polyethylene and high density polyethylene are used.

Protection of crops-

Plastic plays an important role in controlling the insect pest in the field as it absorbs UV radiations which interferes with the lifecycle of insects and pathogens and also controls plant viruses that are transmitted by insects. It is observed that aphids, leaf hoppers and whitefly infestation are less in plastic films that absorbs UV light. Use of these plastic films lowers the infestation of insect pest in various crops and increases the productivity.

PLASTICULTURE- POST-HARVEST MANAGEMENT

Plasticulture technologies are widely used for postharvest management. Plastic properties made it more acceptable and successful in agriculture. The areas where plastic is used in post harvest management are long term and short term storage, for drying and transportation of produce.

1. Drying of produce

Drying is simple method to preserve the agricultural produce for the long time. For drying of vegetables and fruits poly house multitier drier is used which provides micro climatic condition.

2. Transportation of agriculture produces (packaging and storage)

Plasticulture technology is effectively used in transportation, and storage of agricultural produce. It gives opportunity to preserve the produce from short to long term storage. Plastic packaging gives microclimatic condition to the agricultural produce which maintains its quality and extends its shelf life. After harvesting produce is transferred from field to storage units or for packaging in which plastic is used Apart from this it is also easy to handle, involves lower cost, flexibility in storage and transportation. Mostly used plasticulture technologies in agriculture are leno bags, colored shade nets, boxes, plastic crates, and bins and modified atmospheric packaging. Plastic technology is widely used in vegetables and fruits distribution chain. It helps in easy movement of produce from one place to another. Plastic technology provides protection of produce from water, dust, friction injuries and compression bruising during its transport and handling. It provides. Plastic containers in which produce is packed are convenient for handlers as well as for the consumers.

CONCLUSION-

Plastic used in agriculture came as boon to the agriculture sector. With use of plastic in agriculture productivity and production both have increased because this approach controls the pest and weed population. Due to lack of standardization designs, local level service, affordability and information farmers are still not aware about the plasticulture and its benefits. More focus should be put to improve the techniques to make it more economic so that it can be easily used by the farmers in their field. Plastics are used in agriculture in one way or the other from the soil preparation to the post harvest packaging. Post harvest technology it is reducing storage and transportation loss. Use of plastic films should be used for many additional crops in the next decade. Biodegradable plastic should be more used in order to eliminate pollution caused by plastic and to maintain sustainability in the environment. In India shape of farming will be changed with the advancing importance of plastic with its flexible nature.